



DARPA Tech

2002 Symposium

Transforming
Fantasy





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P. McCreery**
Program Manager

Transforming
Fantasy

CBD Sensors Program

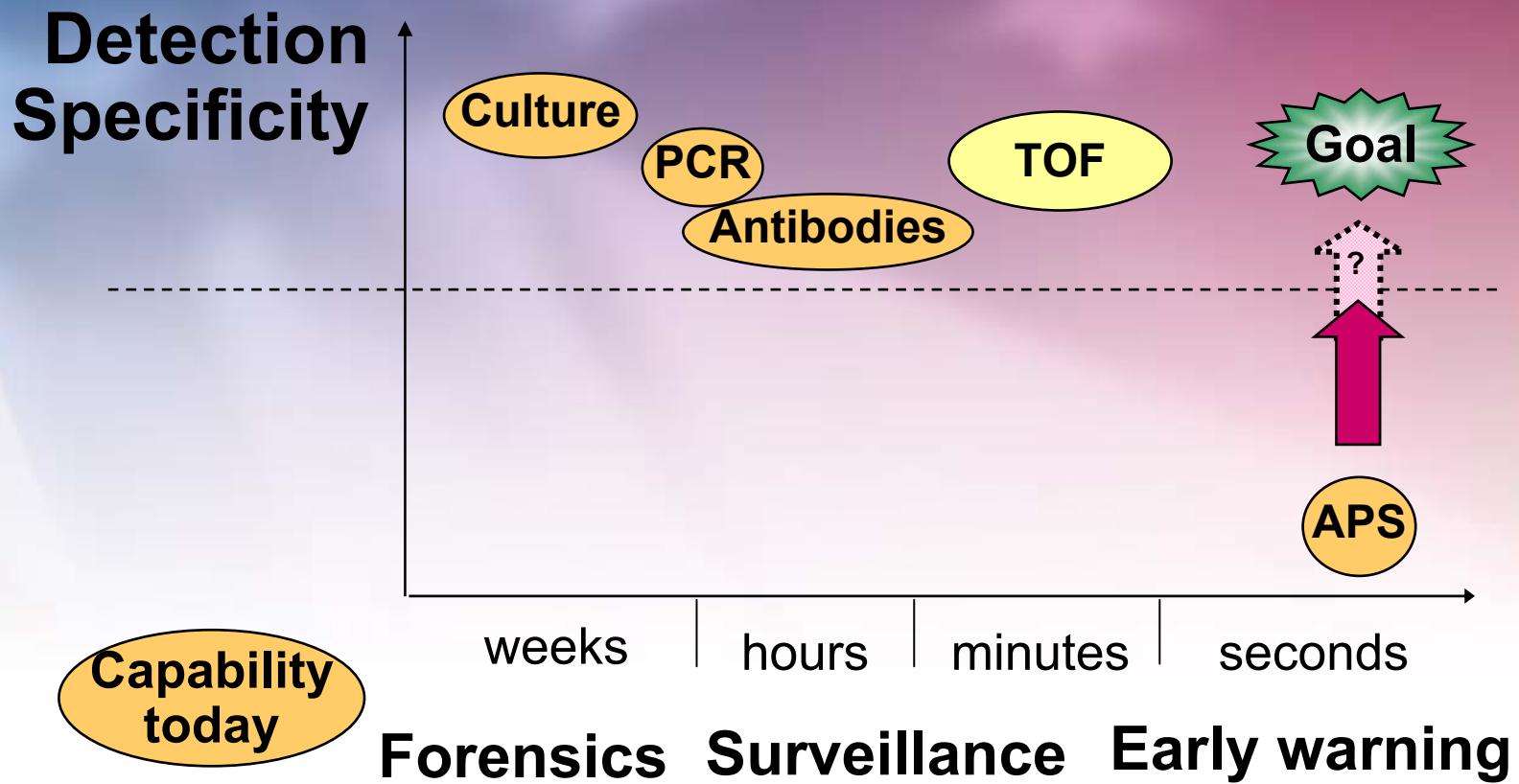
Tom McCreery

Steven Buchsbaum

Special Projects Office



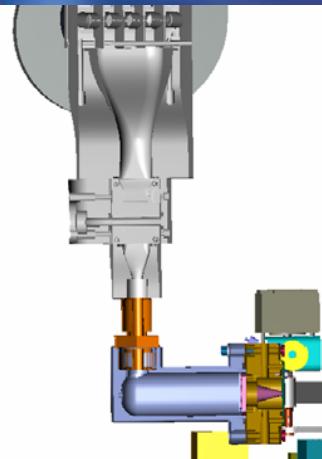
Bio Sensors Context



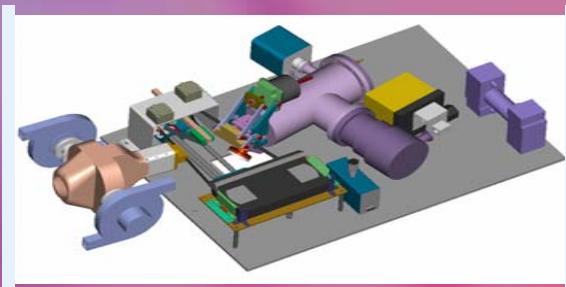
Biological Agent Detection



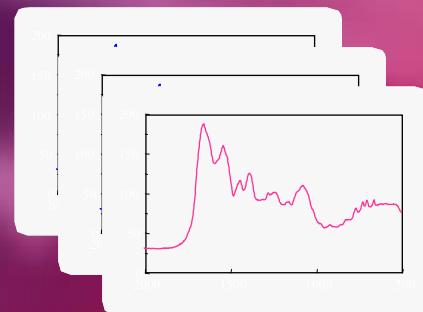
1). Sample Collection



2). Sample Prep



3). Agent Identification



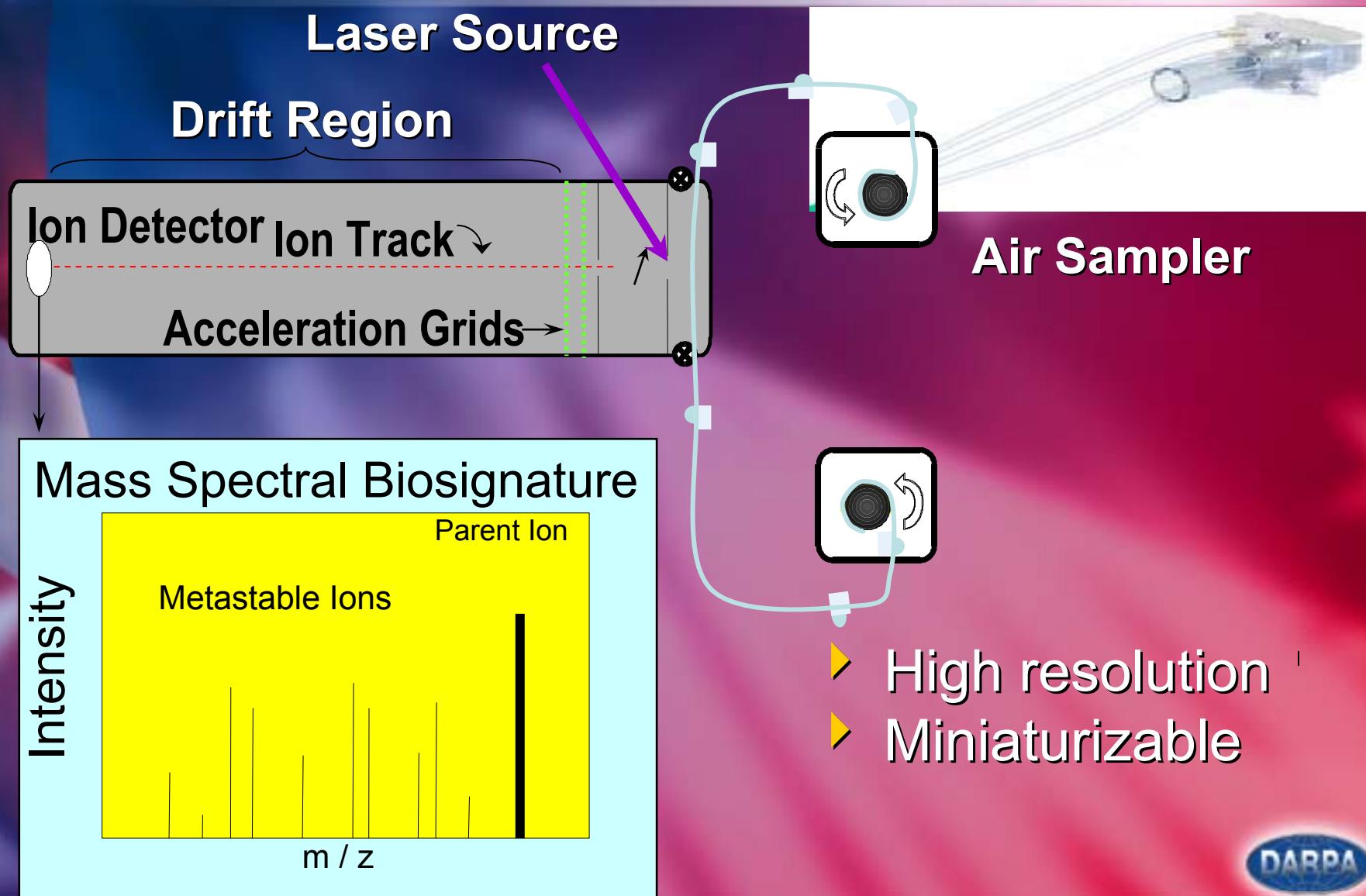
5). Signature Analysis



4). Signal Reporting



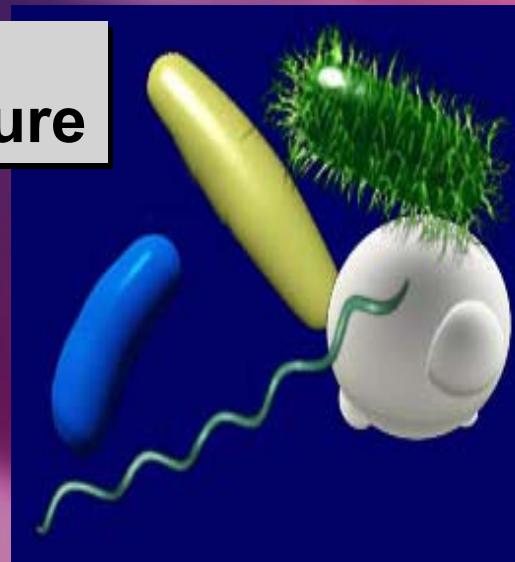
TOF Schematic



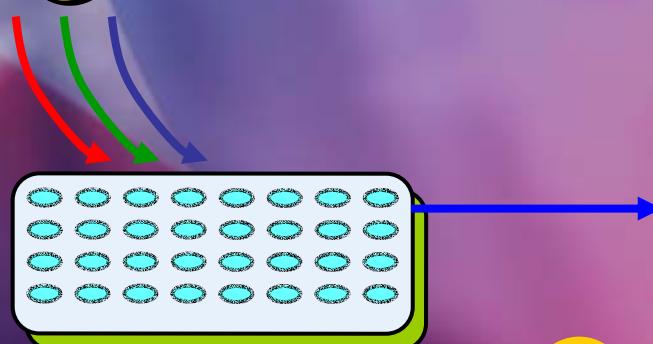
Tiger Sensor Process

Start with
Microbe mixture

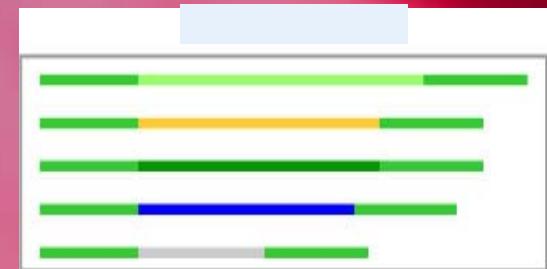
1 Extract DNA Mixture



2 Add Universal Primer Sets



4 PCR Products



3 PCR Amplification

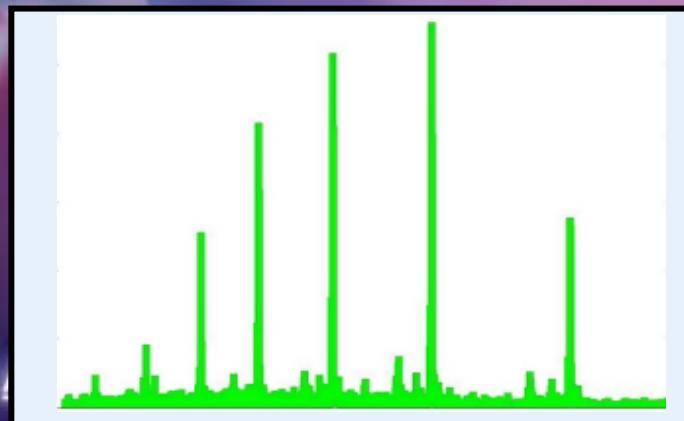


Tiger Sensor

5 Mass Spectrometer Analysis



<u>Organism</u>	<u>Mass</u>	<u>Base Count</u>
<i>E. coli</i>	40440.652	A ₃₄ G ₄₂ C ₂₉ T ₂₆
<i>S. milleri</i>	42838.082	A ₄₄ G ₃₃ C ₂₄ T ₃₇
<i>M. leprae</i>	41628.768	A ₂₇ G ₄₃ C ₃₀ T ₃₄
<i>Unknown brucella</i>	40479.625	A ₃₀ G ₄₄ C ₂₉ T ₂₉
<i>T. medium</i>	43515.168	A ₃₂ G ₃₉ C ₂₇ T ₃₄



6

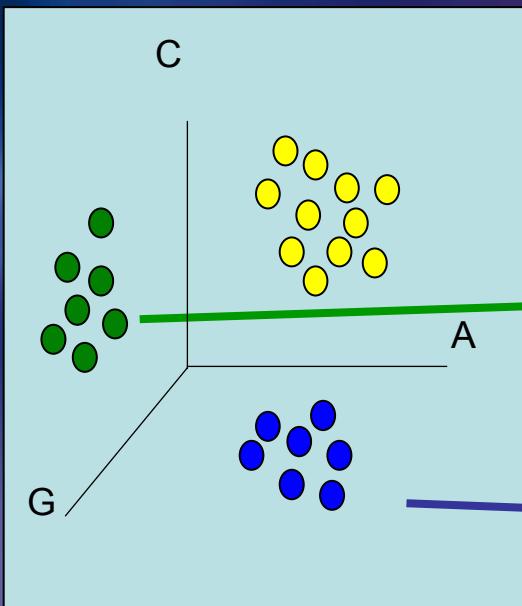
Mass Spectrum to Base Composition



Tiger Sensor Results

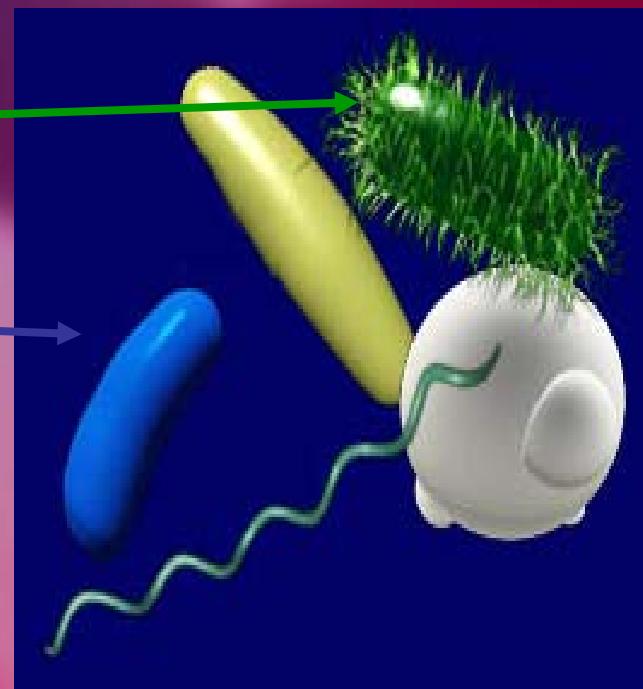
7

Base Composition
to Organism Map



8

ID Sample



Electro-magnetic Spectrum

Microwave

MM wave

Infrared



UV

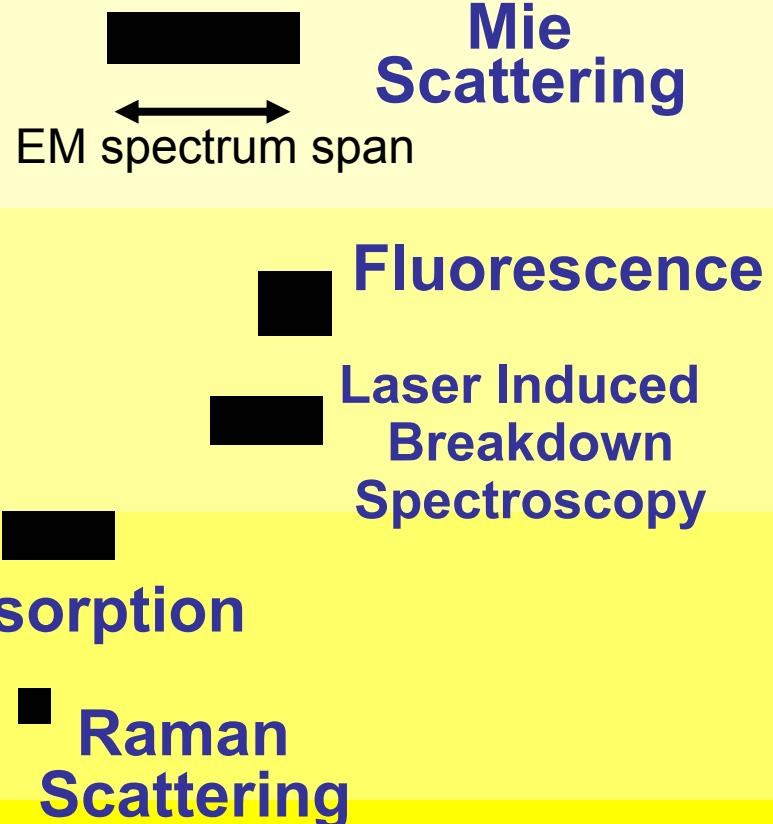
Particle Size

Bio/Non Bio



Direction of
increasing
selectivity

THz
Spectroscopy



BioAerosol Government Team

Government Provided Bioaerosol Test-bed

- ▶ Support Bioaerosol test-bed
- ▶ Define detailed protocols for measurements



BioAerosol Competitive Performers

Phase I

- ▶ Evaluate new bioaerosol sensor concepts
 - Subject new concepts to rigorous performance modeling
 - Validate models with Bioaerosol test-bed measurements

Phase II

- ▶ Develop new advanced BioAerosol sensor prototypes



Wide Area Surveillance

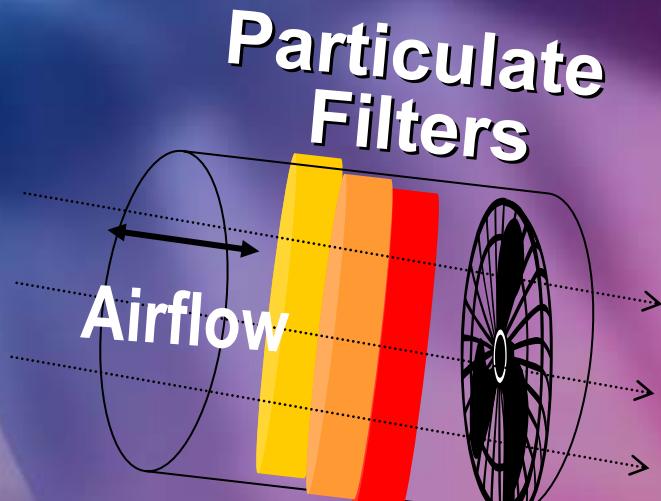
- ▶ Architecture for military force protection and homeland defense
 - Bio-surveillance & forensics
 - Bio-medical surveillance & regional coordination
- ▶ Critical challenges include timeliness and false alarm rate reduction



Individual Monitoring

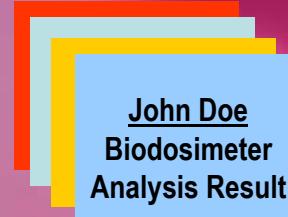
Bio-surveillance

- ▶ Air, water, food
- ▶ Individual Exposure Monitor



Personal Dosimeter

Regional/National
Database





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